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1/77

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The Patent Office
Cardiff Road
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1. Your reference

A25766

2. Patent application number
(The Patent Office will fill in this part)

9907439.5

31 MAR 1999

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

BRITISH TELECOMMUNICATIONS public limited company
81 NEWGATE STREET
LONDON, EC1A 7AJ, England
Registered in England: 1800000

Patents ADP number *(if you know it)*

1867002

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

4. Title of the invention

METHOD AND APPARATUS FOR TRANSFERRING DATA

5. Name of your agent *(if you have one)*

EVERSHED, Michael

"Address for Service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

BT GROUP LEGAL SERVICES
INTELLECTUAL PROPERTY DEPARTMENT
HOLBORN CENTRE
120 HOLBORN
LONDON, EC1N 2TE

Patents ADP number *(if you know it)*

~~1867001~~ 7138043001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day/month/year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.

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YES

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Continuation sheets of this form	
Description	8
Claim(s)	2
Abstract	-
Drawing(s)	6 & 6

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Priority Documents	
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature(s) Michael Eversheds Date: **31 March 1999**

EVERSHED, Michael, Authorised Signatory

12. Name and daytime telephone number of person to contact in the United Kingdom **Lisa Colton** **0171 492 8146**

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Notes

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Method and Apparatus for Transferring Data

The present invention relates to the transfer of data between points in a network and in particular to the transfer of data over a digital communications link comprising a signalling channel and a data channel. One example of such a link is provided by Integrated Services Digital Network (ISDN) equipment.

ISDN enables devices to communicate with each other using digital signals over a standard telephone network. ISDN network terminating units (NTUs) provide a communications link made up of a signalling channel and one or more data channels. The signalling channel is used to establish and control connections via one or more of the data channels. The data channels are used to transfer data.

Computers and other processors are connected to a network of other computers by either a permanent link or a temporary link. Permanent links are commonly provided by cabling that connects a network card installed in the computer to the rest of a local area network (LAN). The computer is thereby permanently connected to the network and can usually send and receive data over the network at any time. Temporary links are commonly provided via a telephone network, the computer being provided with a modem so as to be able to send and receive data over a telephone line. In order to send or receive data, the computer has to dial up another computer that provides a suitable service and establish a connection before any data can be transferred between the computers. One example of a temporary connection is that made by a home or office computer to an internet service provider (ISP).

While a permanent connection via a LAN provides immediate access to other computers via the network, it requires a significant investment in cabling which is expensive and in many cases unfeasible. The alternative temporary dial up connection is a cheaper solution but data can only be sent and received during a connection. Connections via the telephone network usually incur call charges, thus normally prohibiting the use of a dial up connection as a permanent network link.

According to one aspect of the invention there is provided a network terminating unit (NTU) for receiving digital data via a communications link comprising a signalling channel and one or more data channel(s), said signalling channel being operable to establish and control connections between said NTU and one or more data sources via said communications link so that data can be transferred from the or each data source to the NTU via one or more of the data channel(s), the NTU being operable to detect messages transmitted on the signalling channel that contain data of a predetermined type, to extract the data and to store the data for passing to a destination device.

This arrangement has the advantages that it can give the user an early indication of e-mails having arrived at the server computer of the Internet Service Provider (ISP). In other words, the user does not have to dial up the ISP to check for new data/e-mail. In addition, data such as e-mail can be downloaded to the NTU during periods of low use or overnight. A further advantage is that the number of calls made to the ISP may be reduced.

Figure 1 is a schematic representation of a computer network embodying the present invention;

Figures 2a and 2b show the format of messages sent between devices in the network of Figure 1;

Figure 3 is a flow diagram illustrating processing carried out by one of the computers in the network of figure 1;

Figure 4 is a schematic representation of a network terminating unit in the network of figure 1; and

Figure 5 is a flow diagram illustrating processing carried out by the network terminating unit of Figure 4.

Figure 1 shows a computer network 101 (simplified for the purposes of this description) comprising a server computer 103 connected to a database 105 and a network 107. The server 103 is running conventional software for providing an e-mail service. The database 105 is used for storing data associated with providing an

e-mail service. The network 107 comprises a combination of computer networks and telephone networks to provide connections between the server computer 103 and other computers. A connection 109 is shown between the network 107 and a network terminating unit (NTU) 111 which in turn is connected to a modem 113 and a client computer 115. The client computer 115 is a conventional desktop computer such as a PC running e-mail client software for sending and receiving e-mail.

The connection 109 allows the client computer 115 and the server computer 103 to communicate with each other so that a user of the client computer 115 can send and receive e-mail or other data via the server computer 103. The connection 109 is an ISDN (Integrated Services Digital Network) connection that provides digital communications between the two computers 103, 115. Accordingly, the NTU 111 is an ISDN NTU and the modem 113 is a conventional ISDN modem. Similarly, the server computer 103 also comprises the functionality of an ISDN modem and an ISDN NTU (not shown).

As noted above, the ISDN connections provide a digital (as opposed to analogue) connection between two pieces of equipment. Typically, the link comprises two high bandwidth channels called B-channels for carrying user's data and a lower bandwidth channel called a D-channel for carrying out signalling and connection control. In other words, the D-channel is used to set up and monitor a connection between two pieces of equipment and carries out the necessary communications with the telephone network to do so. The connection itself is provided via one (or more) of the B-channels under the control of the D-channel. The B-channel is the normal conduit for the data transmission.

The way in which ISDN connections function is defined in Recommendations published by the Telecommunication Standardisation Sector of the International Telecommunication Union (ITU-T). One such recommendation is entitled "Digital Subscriber Signalling System No. 1 (DSS 1) – ISDN User-Network Interface Layer 3 Specification for Basic Call Control" (ITU-T Recommendation Q.931). This recommendation specifies the procedures for the establishing, maintaining and

clearing of network connections at the ISDN user-network interface. The procedures are defined in terms of messages exchanged over the D-channel of the ISDN link. The layer (Layer 3) referred to in the title of the recommendation is a layer in the protocol structure used for carrying out digital communications. Layer 3 of the ISDN protocol structure includes the signalling that ensures that messages are routed to the appropriate destinations, messages are acknowledged and communications are controlled. In other words, layer 3 is the protocol level of D-channel signalling.

Figure 2a illustrates the format for every message 201 transmitted on the D-channel in accordance with the ITU-T Recommendation. Each message 201 comprises a protocol discriminating part 203, a call reference 205, a message type indicator 207 and an information element 209. The protocol discriminating part is used by the network 107 to discriminate between messages for user-network call control and other types of message and is always the first part of any message. The call reference 205 is a unique identifier that distinguishes all messages for a particular connection or call from other messages. The message type indicator 207 identifies the function of the message being sent. The information element 209 carries additional information particular to pieces of equipment in the network 107 and will be described further with reference to Figure 2b.

One form of additional information that may be carried by the information element 209 is termed "user-user" information. Such information is not interpreted by the network 107 during its transmission but is delivered transparently to an ISDN destination. Figure 2b illustrates the structure of a user-user information element. The first part of the element is the identifier 211 that identifies the element 209 as user-user as opposed to any other of the possible elements defined by the ITU-T Recommendation. The second part 213 indicates the length of the element 209 which has a network dependant limit of 35 or 131 octets for messages sent in association with a circuit-mode connection and a limit of 260 octets for those messages sent in a temporary or permanent user-user signalling connection. The third part 215 of the element 209 is used to discriminate the protocol of the element 209 from that of other elements. The fourth part 217 is the section of the message that

can be used for carrying the user's information. The form of the contents of this message section 217 are unrestricted.

The third part 215 of the element 209 is used to identify the protocol being used for the message. In accordance with the ITU Recommendations, this can be a user specific protocol that enables the fourth part 217 of the element 209 to be structured in accordance with the user's needs i.e. in accordance with a user-defined protocol. In the present embodiment, the user-user message facility is used to pass e-mail messages between the computers 103, 115 as will be described in further detail below.

The server computer 103 is capable of creating a conventional ISDN connection via the network 107, NTU 111 and the modem 113 to the client computer 115. With reference to Figure 3, the e-mail software running on the server computer 103 is arranged to respond at step 301 to either of two stimuli. These stimuli are either the receipt of one or more e-mail messages destined for the user of the client computer 115 or to a predetermined time having elapsed. When one of the two stimuli is received, then at step 303, the server 103 opens a D-channel user-user signalling connection to the NTU 111. At step 305, information representing the number of messages is passed to the NTU in a signalling message. Then at step 307, identifications of the senders or the titles of each message (or both) are sent to the NTU in one or more signalling messages. At step 309, the text of each message is sent to the NTU in one or more signalling messages. Then at step 311, any attachments to the e-mail messages already sent are then sent to the NTU. Once all the messages have been sent, the server process returns to step 301 to await a further stimulus.

With reference to Figure 4, the NTU 111 comprises a transmission control unit 401 connected between the network connection 109 and the modem 113. The transmission control unit 401 operates under the control of a micro-processor 403 which is also connected to a local storage device 405. The micro-processor 403 in combination with the transmission control unit 401 are arranged to carry out the

functions of a conventional ISDN NTU. In addition to these conventional functions, the processor is also arranged to detect incoming user-user signalling messages on the D-channel that use a user defined protocol that indicates the fact that a message contains information relating to e-mail messages. Also, the micro-processor is arranged to detect whether or not the computer 115 and modem 113 are connected to it and active.

With reference to Figure 5, at step 501, the processor 403 scans incoming user-user signalling messages for those containing e-mail data and when such a message is received, moves to step 503. As will be understood from the description of the transmission of the e-mail data by the server 103 (with reference to figure 3), each user-user message may only contain parts of e-mails or their attachments. Accordingly, if partial information is received, this is placed in the store 405 at step 505 and the process returns to step 501. If at step 503 part of an e-mail or attachment is received that completes data already placed in the store 405 then the process moves to step 507. Similarly, if a complete e-mail text, list of titles or attachment is received, the process moves to step 507. At step 507, the completed e-mail information is placed in the store 405 and the process moves to step 509 and establishes whether the computer 115 is active (i.e. booted up and running). If the computer 115 is not active then the process returns to step 501. If the computer 115 is active then at step 511 the processor identifies the new and complete messages or parts thereof in the store 405 and, if present, moves to step 513. If at step 511 no new and complete messages (or parts thereof) are present the process returns to step 501. At step 513, the processor is arranged to transfer the complete messages (or parts thereof) to the computer 115 for display to the user via the client e-mail software. Once the transfer is complete, the process returns to step 501.

The processor 403 is also arranged to respond to two further events. Firstly, if the processor 403 detects at step 515 that the computer 115 has just booted up then the process moves to step 509 as described above. Secondly, if the processor detects at step 517 that the modem 113 is being used to dial a number that corresponds to the server computer 103, the processor postpones the call and moves

to step 509. This ensures that the e-mail already stored in the NTU 111 can be presented to the user before the process of dialling up the server 103 is proceeded with.

The server computer 103 and the client computer 115 are arranged to send user-user messages that contain sufficient information to enable the NTU 111 to establish how parts of e-mails sent in separate messages are linked to enable the NTU 111 to reconstitute the e-mail messages. Suitable protocols for enabling the NTU 111 to carry out this function are readily available to those skilled in the art.

As described above, the timing of the downloading of the e-mail data can be triggered by new e-mail arriving at the server 103 or by a predetermined time having elapsed. In addition or alternatively, the downloading could be triggered when activity on the D-channel is at a minimum such as during the night. In addition to e-mail being downloaded it would also be possible to download other data (including instruction data) such as previously ordered software, the results of searches, news information or telemetry data. As well as being used to download data from the server to the client computer, the arrangement described above can also be useful for sending data from the client computer to the server computer such as e-mails for sending. With such an arrangement it would then be possible to send and receive non-urgent data without needing to make a specific call to the appropriate e-mail/internet service provider. This would reduce the use of valuable B-channel bandwidth and increase the convenience to the user.

In the embodiment described above, the server computer is arranged to download all of each e-mail message. As an alternative, the server could be arranged to download only partial information such as the number of e-mails, their titles or the sender details. Such details could then be displayed or indicated to the user by the NTU itself without the need for the client computer. This would enable users to judge whether a call to the internet service provider (ISP) to download all the e-mails was justified. This feature would also enable a user to detect when a particular e-mail has arrived without having to make repeated calls to the ISP.

The client or server software can be arranged to be configurable by the user so that the amount or type of data that is downloaded can be defined by the user. In addition, the timing of any download can be governed by user configuration. As a further alternative, the server or client software can be arranged to detect when a particular download will exceed a predetermined time limit and instead to open a B-channel to complete the download. Similarly, if the D-channel is busy or congested or if the download is large and/or urgent a B-channel can be opened and used for the download.

As will be understood by those skilled in the art, the processing required to provide the functions described above need not be provided by the server computer of the ISP but, instead, could be provided by an alternative processor in the network between the ISP and the client computers. Such a processor may be in a telephone network router or other network element.

As will be understood by those skilled in the art, the invention described above may be embodied in one or more computer programs. These programmes can be contained on various transmission and/or storage mediums such as a floppy disc, CD-ROM, or magnetic tape so that the programmes can be loaded onto one or more general purpose computers or could be downloaded over a computer network using a suitable transmission medium.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising" and the like are to be construed in an inclusive as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

CLAIMS

1. A network terminating unit (NTU) for receiving digital data via a communications link comprising a signalling channel and one or more data channel(s), said signalling channel being operable to establish and control connections between said NTU and one or more data sources via said communications link so that data can be transferred from the or each data source to the NTU via one or more of the data channel(s), the NTU being operable to detect messages transmitted on the signalling channel that contain data of a predetermined type, to extract the data and to store the data for passing to a first destination device.

2. An NTU according to claim 1 further comprising means operable to send data received from the destination device to further destination devices using messages transmitted on the signalling channel.

3. An NTU according to claim 1 or claim 2 in which the communications link is provided via Integrated Services Digital Network (ISDN) equipment.

4. An NTU according to any preceding claim in which the data of a predetermined type represents a part or a whole of one or more e-mail message(s) or other textual message(s).

5. An NTU according to claims 1, 2 or 3 in which the data of a predetermined type represents a software download, database search results, news information or telemetry data.

6. An NTU according to any preceding claim further comprising means operable to detect whether the first destination device is active so as to be able to receive the data and, if said device is active, to transmit the data stored by the NTU to the device.

7. An NTU according to any preceding claim further comprising means operable to receive data from the destination device and to package the data in one or more signalling messages for transmitting the data to a further destination device.

8. An NTU according to any preceding claim further comprising means operable to detect signalling messages indicating the set up of a connection to a predetermined destination device and in response to such detection to transmit the data stored by the NTU to the predetermined destination device.

9. An NTU according to any preceding claim further comprising means operable to monitor the activity of the signalling channel and to send and/or receive the data of a predetermined type when the signalling channel activity is within a predetermined range.

10. An NTU according to any preceding claim further comprising means operable to send and/or receive the data of a predetermined type during a predetermined time interval.

11. An NTU according to any preceding claim further comprising means operable to estimate the time for transmitting data to a destination via the signalling channel and, if the time exceeds a predetermined threshold, to transmit the data to the destination using one or more of the data channels.

12. An NTU according to any of claims 4 to 11 further comprising means operable to:

a) firstly establishing the number of messages to be transmitted to a destination device and transmitting data representing said number;

b) secondly identifying the sender of each message to be transmitted to the destination device and transmitting data representing each said sender;

c) thirdly transmitting data representing the text of each message to the destination device.

Figure 1

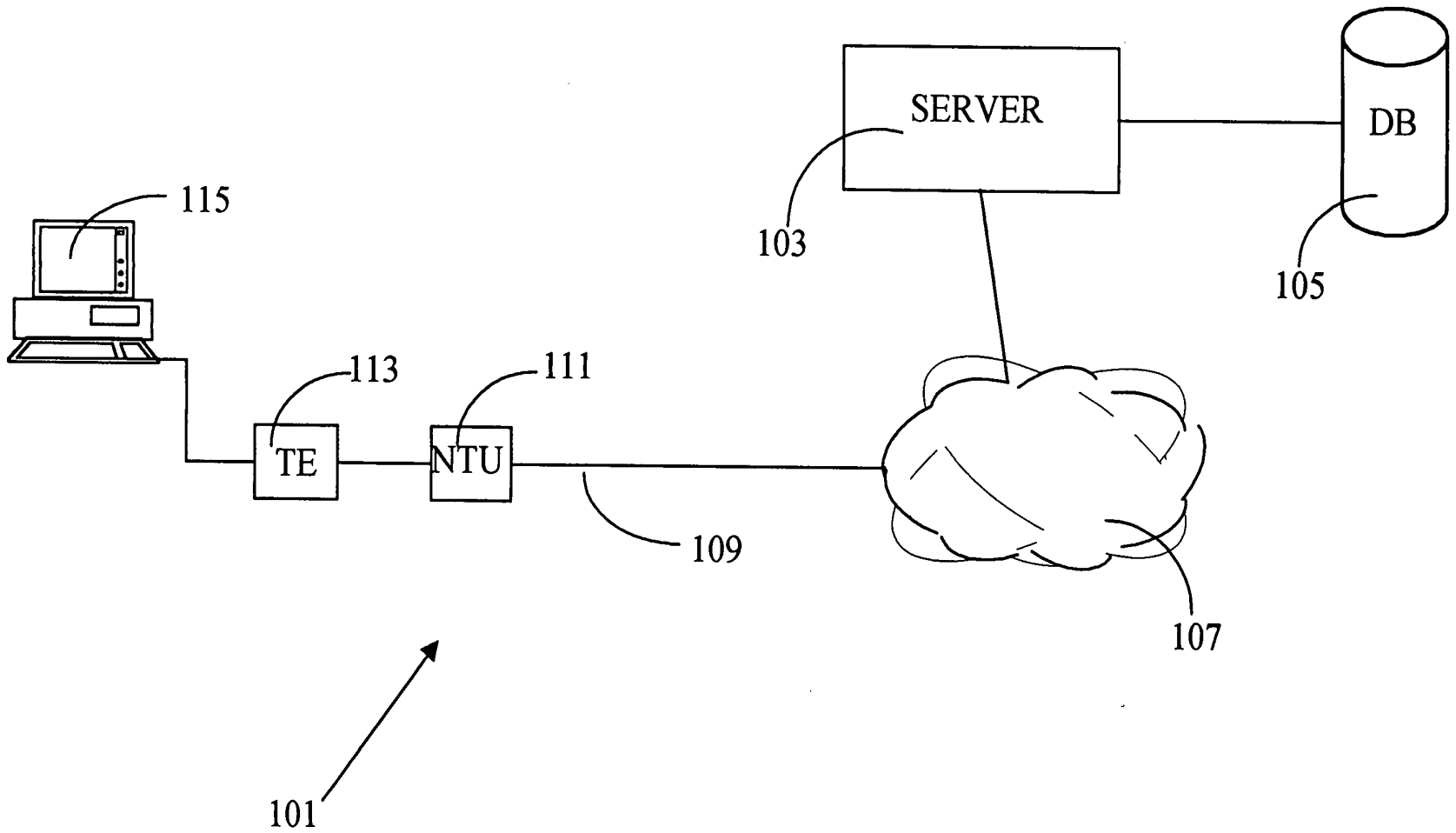


Figure 2a

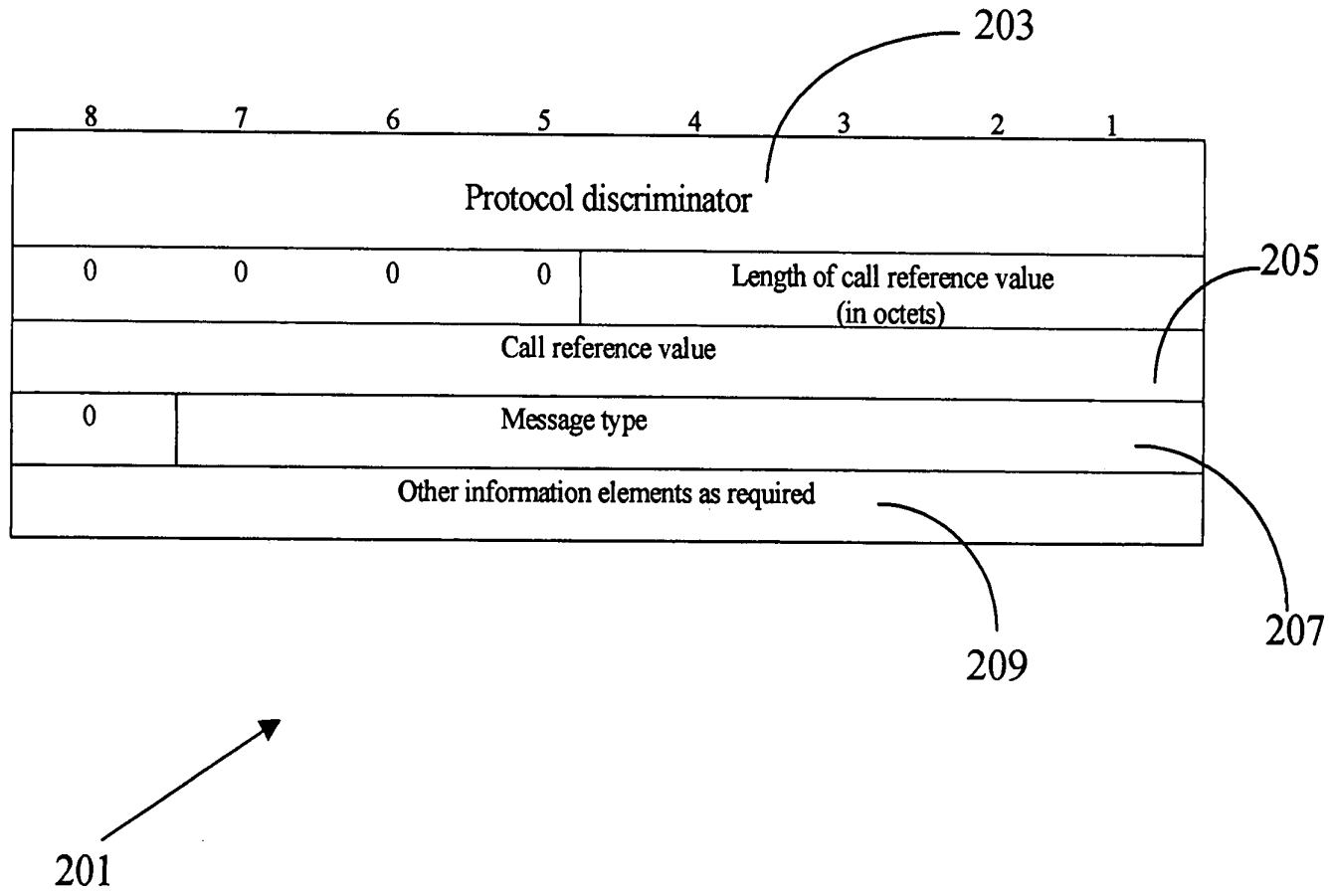

203
8
7
6
5
4
3
2
1
Protocol discriminator
0
0
0
0
Length of call reference value
(in octets)
205
Call reference value
0
Message type
Other information elements as required
209
207
201

Figure 2b

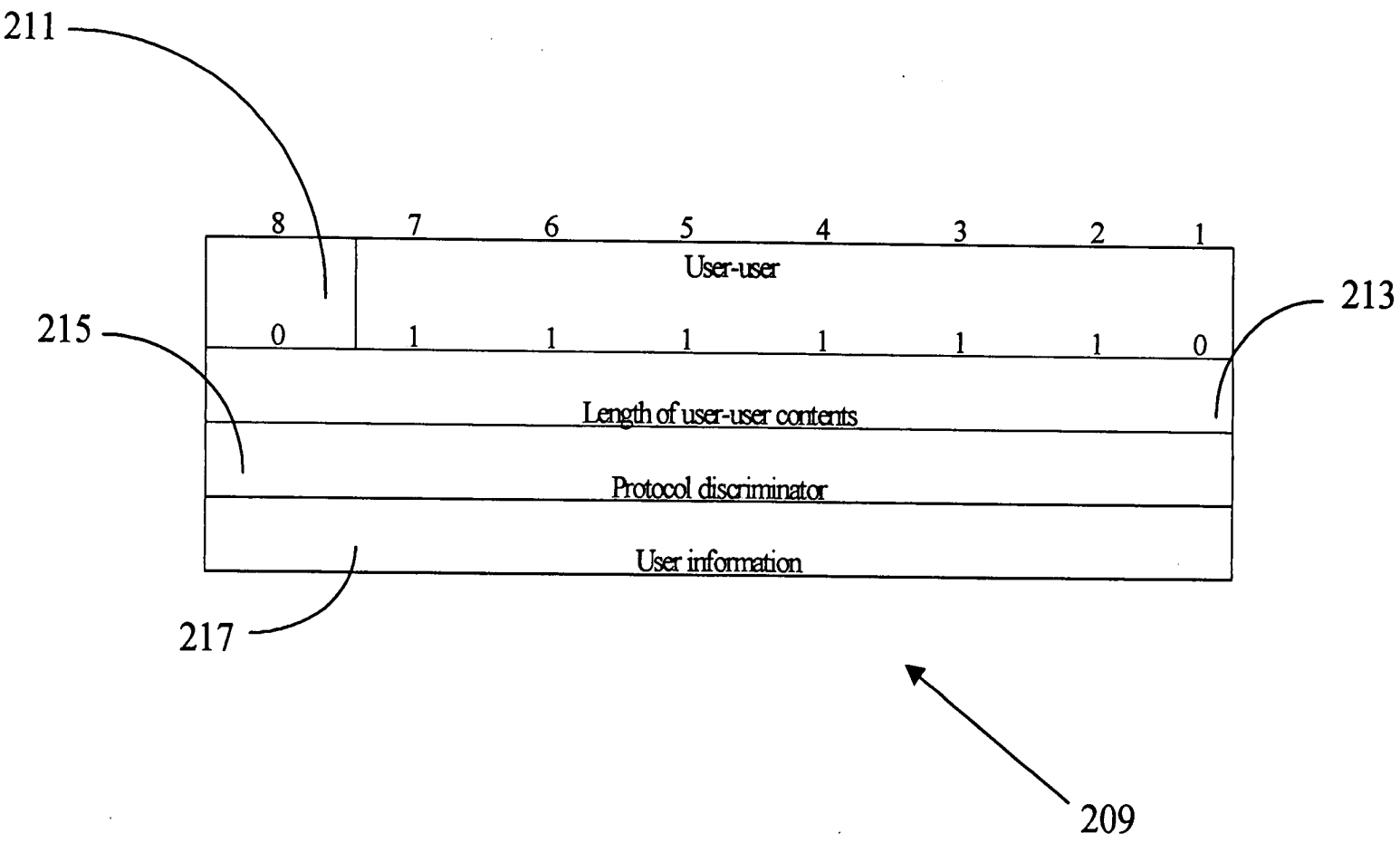

211
8
7
6
5
4
3
2
1
User-user
215
0
1
1
1
1
1
1
0
213
Length of user-user contents
Protocol discriminator
User information
217
209

Figure 3

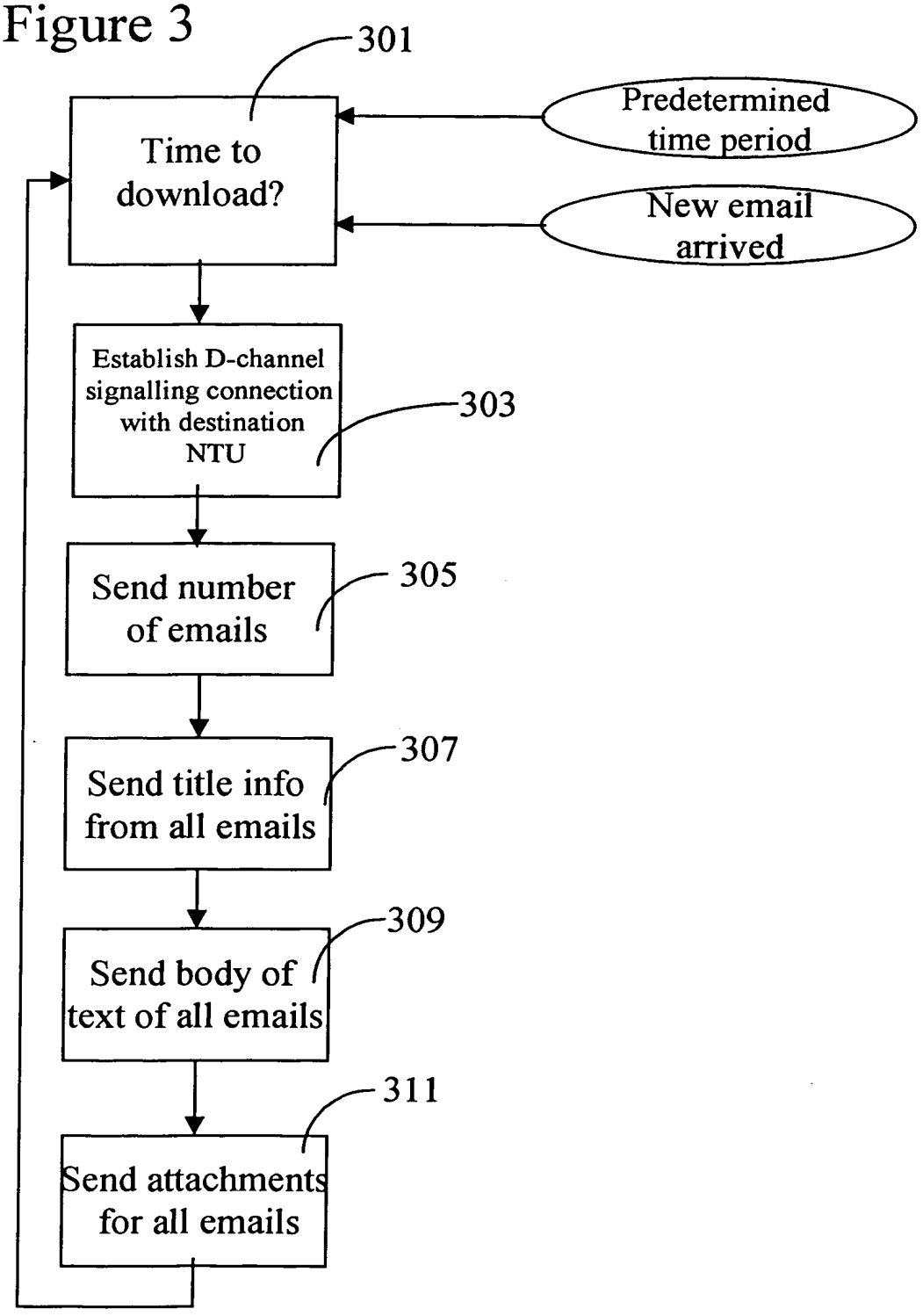

301
Time to download?
Predetermined time period
New email arrived
Establish D-channel signalling connection with destination NTU
303
Send number of emails
305
Send title info from all emails
307
Send body of text of all emails
309
Send attachments for all emails
311

Figure 4

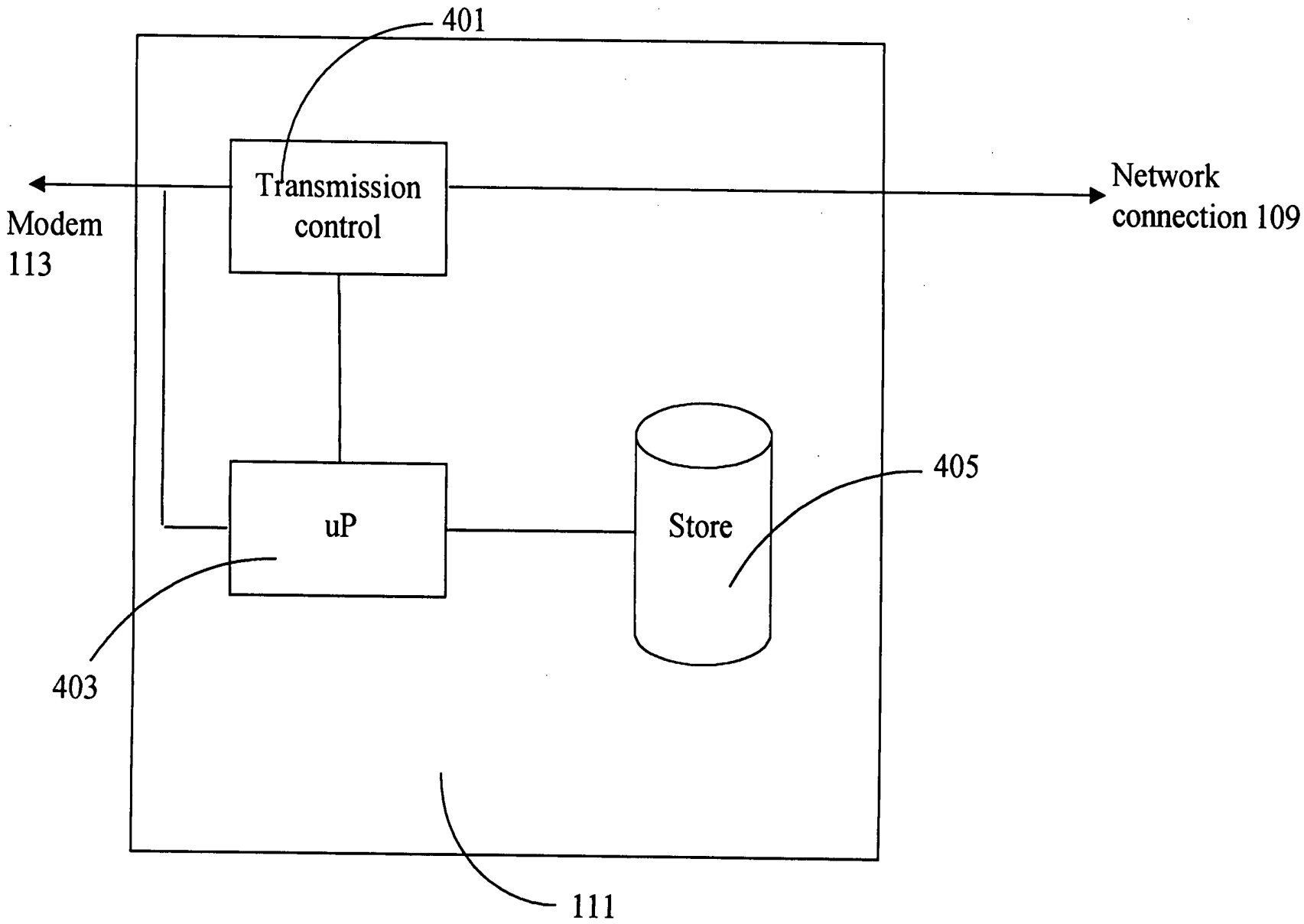
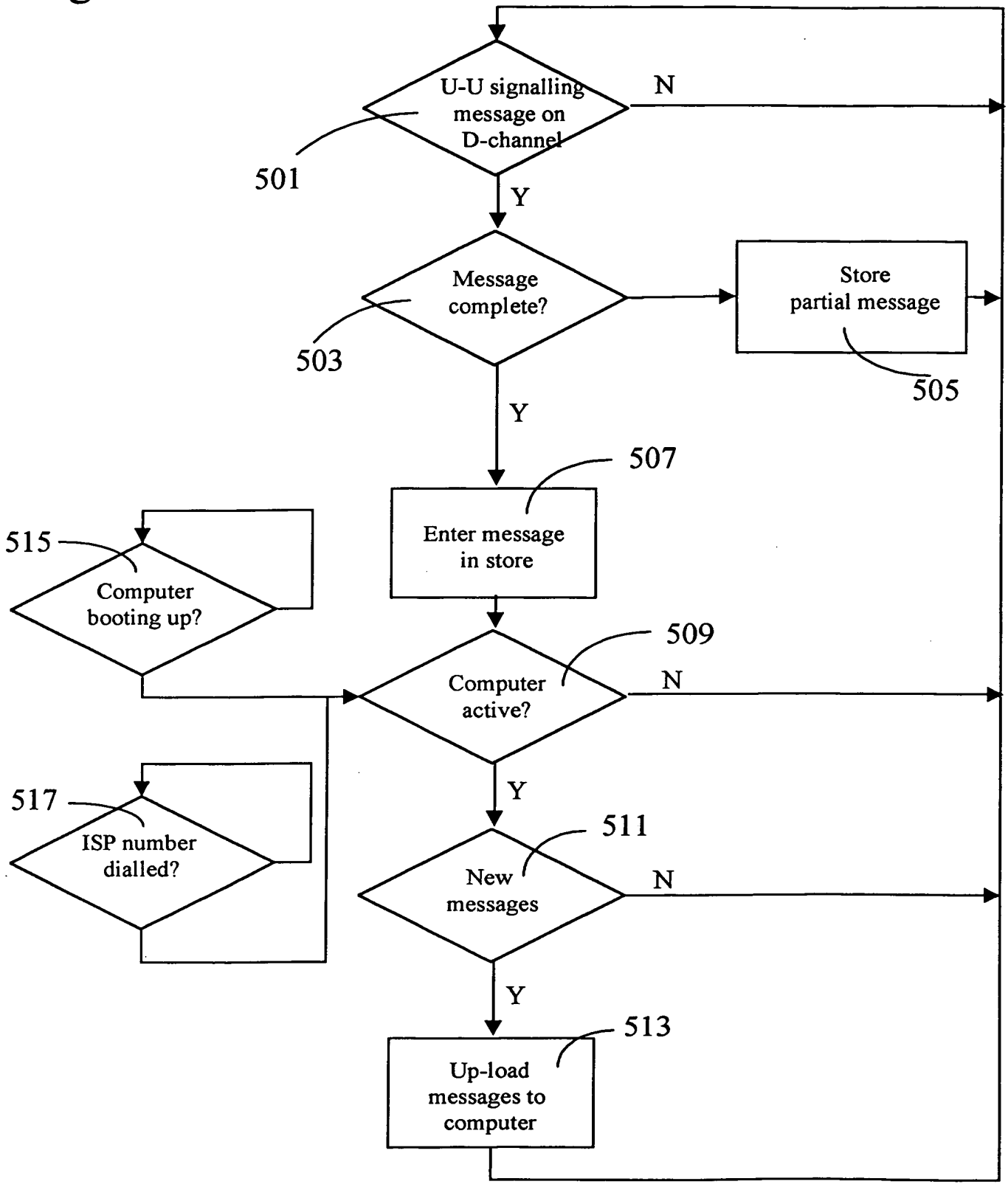

401
Transmission control
Modem 113
Network connection 109
uP
Store
405
403
111

Figure 5


U-U signalling message on D-channel
N
501
Y
Message complete?
Store partial message
503
505
Y
507
Enter message in store
515
Computer booting up?
509
Computer active?
N
517
Y
ISP number dialled?
511
New messages
N
Y
513
Up-load messages to computer